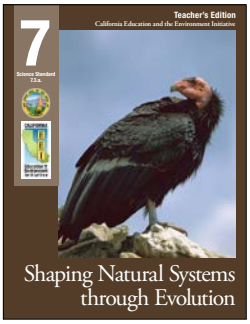
California Education and the Environment Initiative
Increasing Environmental Literacy for K–12 Students…
Because the Future is in Their Hands

TEACH COMMON CORE STANDARDS
WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

7.3.a.—Shaping Natural Systems through Evolution



In this unit, students learn the foundational principles of evolutionary theory, grounded in evidence-based research and featuring examples of California flora and fauna. Students explore basic ideas about adaptation, evolution, and diversity and analyze current scientific studies that introduce the dynamics of natural selection. They participate in a lively simulation that highlights the role of genetic variation in natural selection. Hands-on activities, such as using maps and other information and examination of a banana, examine how human activity influenced evolutionary change in a species.

LESSONS	RST.6–8.1	RST.6–8.2	RST.6–8.3	RST.6–8.4	RST.6–8.5	RST.6–8.6	RST.6–8.7	RST.6–8.8	RST.6–8.9	RST.6–8.10	WHST.6–8.1	WHST.6–8.2	WHST.6–8.4	WHST.6–8.6	WHST.6–8.8	WHST.6–8.9	SL.7.1	SL.7.2	SL.7.4	SL.7.5	L.7.1	L.7.4
California Connections	✓	✓			✓		✓	✓			✓	✓									✓	✓
1	✓			✓					✓	✓	✓	✓					✓	✓	✓			✓
2	✓			✓						✓					✓		✓		✓			✓
3			✓	✓					✓		✓						✓		✓			✓
4				✓			✓		✓									✓				✓
5	✓			✓						✓		✓					✓	✓	✓			✓
6	✓			✓		✓						✓				✓			✓			✓
Traditional Assessment		✓										✓				✓						
Alternative Assessment												✓	✓	✓		✓				✓		

COMMON CORE STANDARDS

Note: *For your reference, the list of California Common Core State Standards abbreviations is on the following page.*

Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

California Common Core State Standards Abbreviations

- **CCCSS:** California Common Core State Standards
- **L:** Language Standards
- **RST:** Reading Literacy Standards in Science and Technical Subjects
- **SL:** Speaking and Listening Standards
- **WHST:** Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

Note: *Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core Standards Applications is cited, using "…" to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 20–21 of this document.*

A Note about Speaking and Listening Common Core Standards

Many of the EEI units provide various learning structures, materials, and groupings that lead toward students working in pairs or small groups to discuss concepts and ideas. This supports the skill in Speaking and Listening Standard 1 "Participate effectively in a range of collaborative discussions (one-on-one, groups…) with diverse partners." With prior instruction in collaborative discussion techniques, students can be placed in pairs or small groups to discuss the lesson topics. To aid in teacher planning, the lessons are listed below which include tasks for whole class, pairs/partners, and/or small groups:

- **Lesson 1:** Whole class, partners (optional), 3 groups
- **Lesson 2:** Whole class, partners (optional), groups of 4
- **Lesson 3:** Whole class, 3 groups
- **Lesson 4:** Whole class, groups of 4, partners
- **Lesson 5:** Whole class, 8 groups
- **Lesson 6:** Whole class, partners

National Geographic Resources

- **Political** wall map (Lesson 1 and 4)

Unit Assessment Options

Assessments	Common Core Standards Applications
Traditional Assessment	
Students answer a series of multiple-choice and short-answer questions.	**RST.6–8.2:** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. **WHST.6–8.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic. **WHST.6–8.9:** Draw evidence from informational texts to support analysis, reflection, and research.
Alternative Assessment	
Evolution Storyboard (Alternative Unit Assessment Master) has students develop a visual script—a series of images—that simply and briefly illustrates the key components of the species' change over time, along with a written description that explains the mechanism of natural selection. ***Suggestion:*** *Script can be done manually or digitally.*	**SL.7.5:** Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. **WHST.6–8.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic. **WHST.6–8.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **WHST.6–8.6:** Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. **WHST.6–8.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Lesson 1: Natural Selection and Evolution

Students read about the evolution of pupfish species in California and create a class model of natural selection. They predict what kinds of adaptations would be selected in different environments and then review vocabulary describing key evolutionary concepts.


Lesson 1

Natural Selection and Evolution

National Geographic Resources

- **Political** wall map

Use this correlation in conjunction with the **Procedures** located on pages 38–40 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Step 1: Students compare and contrast different genus of pupfish found around California in their **Evolution and Diversity Journal 1** (Student Workbook, page 4). ***Tip:*** *If* **Student Workbooks** *need to be reused from year to year, students should not write in them. Some strategies teachers use to preserve the workbooks are:* ■ *Have students use binder paper or other lined or unlined paper.* ■ *Have students use a sheet protector over the page and write with a whiteboard marker.* ■ *Do together as a class on a projector or chart paper.* ■ *Project the digital fill-in version and do together as a class.* ■ *Students use digital devices to fill in the digital version found on the website.* ■ *Make student copies when necessary.*	**RST.6–8.9:** Compare and contrast the information gained from…multimedia sources with that gained from reading a text on the same topic.
Step 2: As a class, read ***California Connections: Pupfish***. Stop periodically and ask clarifying comprehension questions suggested in **Step 2** on page 38 of the **Teacher's Edition**. ***Suggestion:*** *Reading and discussion of questions could be done in pairs, then as a whole class, to increase individual student involvement.* *Refer to the* ***Reading*** **California Connections** ***Using a Common Core Reading and Writing Focus*** *on pages 15–19 to view specific suggestions for integrating Common Core standards while reading this selection not only for content, but for text structure as well.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.10:** …read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently. **SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas…

Student Tasks	Common Core Standards Applications
Step 2 (Continued): ***Suggestion:*** *In addition to providing support for Reading Literacy standards, the* **California Connections** *selection provides a writing model for the Writing Literacy standards. As students read for content, explicitly point out the text structures the author uses to convey the information. Once familiar with the process, students can identify these structural elements as they read independently.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.10:** …read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently. **SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas…
Steps 3 and 4: Organize students into three groups based on a different **Environment Table**. Students complete Part 1 of **Evolution of Pupfish** (Student Workbook, pages 5–8), describing different traits of the pupfish in their section of the lake. Student volunteers share their answer to the whole class.	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **SL.7.4:** Present claims and findings…, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples…
Steps 6 and 7: Students complete Part 2 of **Evolution of Pupfish**. Each group is given an **Environment Card**, then students rotate among different environment tables.	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.9:** Compare and contrast the information gained from…multimedia sources with that gained from reading a text on the same topic. **SL.7.2:** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **WHST.6–8.1b:** Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text…
Step 8: Students discuss their findings as a whole class.	**SL.7.1d:** Acknowledge new information expressed by others and, when warranted, modify their own views. **SL.7.4:** Present claims and findings…, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples…
Step 10: Students return to ***California Connections: Pupfish***, reading the last paragraph, and answering clarifying comprehension questions suggested in the Procedures for Step 10 on page 40 of the **Teacher's Edition**. ***Suggestion:*** *Reading and discussion of questions could be done in pairs, then as a whole class, to increase individual student involvement.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.10:** …read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Student Tasks	Common Core Standards Applications
Step 10 (Continued):	**SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas…
Step 11: Students complete Part 3 of **Evolution of Pupfish**.	**WHST.6–8.2b:** Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. **WHST.6–8.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic.

Lesson 2: Evidence of Evolution

Students analyze an example of evolutionary change in a California species of snail and take brief notes on the process of evolution. They compare four examples of evolution from current research in evolutionary biology and explain the mechanism of natural selection.

Use this correlation in conjunction with the **Procedures** located on pages 60–61 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Steps 1 and 2: Students independently read Part 1 of **Notes About the *Tegula* Snail** (Student Workbook, page 6), complete **Evolution and Diversity Journal 2** (Student Workbook, page 9), and discuss their findings with a partner or small group. Then read Part 2 and answer clarifying comprehension questions as a whole class.	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.10:** …read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently. **SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas…
Step 3: Students continue to fill out **Evolution and Diversity Journal 2** while the teacher projects **Evolution Notes 1–3** (Visual Aids #4–6).	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **WHST.6–8.8:** Gather relevant information…and…paraphrase the data…

Student Tasks	Common Core Standards Applications
Steps 5 and 6: In groups of 4, students read about each research project and use the information to individually complete the chart **Evidence of Evolution** (Student Workbook, page 10). When finished, they share their charts with the class.	**SL.7.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 7 topics, texts, and issues*, building on others' ideas and expressing their own clearly. **SL.7.4:** Present claims and findings…, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation… **WHST.6–8.8:** Gather relevant information from multiple print… sources (**primary and secondary**),… and…paraphrase the data and conclusions of others…**CA**

Lesson 3: Simulating Variation and Natural Selection

Students look at examples of variation in traits. They participate in a simulation of natural selection, creating model bird beaks and using them to compete for food in different simulated environments. They explore what happens when a new mutation creates additional variation.


Lesson 3

Simulating Variation and Natural Selection

Use this correlation in conjunction with the **Procedures** located on pages 78–80 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Steps 3–10: Have students explain to a partner what their task is, as described in the **Student Edition**. Students play a game with origami beaks and record their data in **Variation and Natural Selection**. There are 4 rounds to this game, each giving a different environmental factor and presenting a genetic mutation. ***Suggestion:*** *Some students may not have good spatial awareness, so stop periodically and check progress of the groups.*	**RST.6–8.3:** Follow precisely a multistep procedure when…performing technical tasks. **SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. **SL.7.4:** Present claims and findings… emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples…
Step 11: Students answer the questions on **Variation and Natural Selection** (Student Workbook, pages 12–15).	**RST.6–8.9:** Compare and contrast the information gained from…simulations… with that gained from reading a text on the same topic. **WHST.6–8.1b:** Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text…

Lesson 4: California's Diversity: Environmental Factors and Evolution

Students review examples about the environment's influence on evolution. They use maps to identify environmental factors, such as climate, elevation, and geography, in different California ecosystems. They read examples of adaptations in California species, and match these traits to their corresponding habitats.


Lesson 4

Lesson 4

California's Diversity: Environmental Factors and Evolution

National Geographic Resources

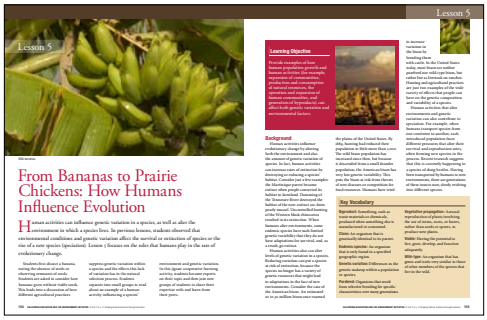
- **Political** wall map

Use this correlation in conjunction with the **Procedures** located on pages 94–95 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Step 3: Students determine the elevation of their hometown using a map.	**L.7.4a:** Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context…
Steps 6–9: Students complete **Traits for Survival** (Student Workbook, pages 17–19) as a group, then in pairs. ***Tip:*** *Step 9 can be done as homework or a continuation of this lesson.*	**RST.6–8.7:** Integrate…technical information expressed in words in a text with a version of that information expressed visually… **RST.6–8.9:** Compare and contrast the information gained from…multimedia sources with that gained from reading a text on the same topic. **SL.7.2:** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

Lesson 5: From Bananas to Prairie Chickens: How Humans Influence Evolution

Students dissect a banana to investigate trait variations in bananas with seeds and without seeds. They read an example about how human activities alter the environment and reduce genetic variation, and they share information with their peers.


Lesson 5

From Bananas to Prairie Chickens: How Humans Influence Evolution

Use this correlation in conjunction with the **Procedures** located on pages 112–113 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Step 1: Students examine slices of a banana and answer questions posed to them. ***Suggestion:*** *Students can discuss the observation of the banana in pairs or small groups prior to whole class discussion to increase individual student participation.*	**SL.7.1c:** …respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
Step 3: In addition to discussing the questions in the **Procedures** for this step, have students discuss the main idea and supporting points as you fill out the **Evolution and Diversity Journal 5** (Student Workbook, page 20). They can turn to partners and share specific points, or do it as a whole class discussion. ***Suggestion:*** *Students will use their listening skills in Step 2 to answer the questions posed in Step 3.*	**SL.7.2:** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **SL.7.4:** Present claims and findings…, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples…
Step 6: After breaking students into 8 groups, they read their assigned **Resource Reading** and complete the **Human Activities and Evolution** (Student Workbook, pages 21–22) chart for their group's species.	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.10:** …read and comprehend science/technical texts… **WHST.6–8.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic.
Step 8: Have students use information that they recorded on **Human Activities and Evolution** to present a summary of their reading to their group members.	**SL.7.1d:** Acknowledge new information expressed by others and, when warranted, modify their own views.

Student Tasks	Common Core Standards Applications
Step 8 (Continued):	**SL.7.4:** Present claims and findings…, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation…

Lesson 6: Revisiting the Pupfish: Human Activities and Evolution

Students read the remainder of ***California Connections: Pupfish*** from Lesson 1. They discuss the influence of human activities on pupfish evolution and use flowcharts to summarize and analyze their findings. They describe the evolution of another species using the same framework.


Lesson 6

Revisiting the Pupfish: Human Activities and Evolution

Use this correlation in conjunction with the **Procedures** located on pages 128–129 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.	**L.7.4c:** Consult…reference materials… to…determine [a word's] meaning… **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
Step 1: Students complete the posed questions in their **Evolution and Diversity Journal 6** (Student Workbook, page 23). When finished, they share their responses with a partner.	**SL.7.4:** Present claims and findings **(e.g., argument, narrative, summary presentations)**, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation. **CA** **WHST.6–8.2b:** Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
Step 2: After redistributing ***California Connections: Pupfish***, students answer a series of questions posted on chart paper. ***Tip:*** *Allow time prior to answering questions for the students to reread and summarize with a partner what they have read.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts.
Steps 3 and 4: Students reread ***California Connections: Pupfish*** and complete Part 1 of **Summary: Human Influence on Evolution** (Student Workbook, pages 24–27). When finished, review the answers as a class. ***Suggestion:*** *If students reread the article in Step 2, then skip rereading and go directly to completing Part 1.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts.
Steps 5 and 6: Students analyze how humans have influenced a species they have studied during this unit. ***Suggestion:*** *This lesson lends itself to a thesis essay, developing the use of support claims and phrases that clarify reasons and evidence for supporting the thesis.*	**RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts. **RST.6–8.6:** Analyze…an explanation, describing a procedure…

Student Tasks	Common Core Standards Applications
Steps 5 and 6 (Continued):	**WHST.6–8.2d:** Use precise language and domain-specific vocabulary to inform about or explain the topic. **WHST.6–8.9:** Draw evidence from informational texts to support analysis, reflection, and research.

Unit Assessment

Refer to the introduction pages at the front of this document for information regarding the Traditional and Alternative Assessments for this unit and their Common Core correlations.

Reading *California Connections* using a Common Core Reading and Writing Focus

Reading

Science teachers can further enhance the teaching of Common Core Reading Literacy Standards by noting the suggestions below and in the following pages while reading the ***California Connections*** selection for content. Explicitly teach students to pay attention to the structure of the text by noting the following:

- Note how the author cites evidence to support main points and analysis. **(RST.6–8.1)**
- Note how the author sets up the central ideas or conclusions; provide an accurate summary of the text distinct from prior knowledge or opinions. **(RST.6–8.2)**
- Analyze how the author describes a scientific process or a multi-step procedure. **(RST.6–8.3)**
- Note how the author explains the meaning of key terms, symbols, domain specific words, and phrases. **(RST.6–8.4)**
- Analyze the structure the author uses to organize the text, including how the major sections contribute to the whole and to an understanding of the topic. **(RST.6–8.5)**
- Analyze the author's purpose in providing an explanation or describing a procedure. **(RST.6–8.6)**
- Note how the information in the California Connections text integrates with information provided visually throughout the unit in diverse formats, including tables, charts, graphs, diagrams, maps, and quantitative data. **(RST.6–8.7)**
- Distinguish among facts, reasoned judgment based on research findings, and speculation in a text, noting the reasoning and evidence used to support the author's claim. **(RST.6–8.8)**
- When other documents or media sources are included, compare and contrast the information presented in the various formats and resources with that from the text, noting how the information contributes to a coherent understanding. **(RST.6–8.9)**
- Note comprehension strategies for understanding the text. **(RST.6–8.10)**

Note: *Standard descriptions from the Reading Standards for Literacy in Science and Technical Subjects are paraphrased and combined, using terminology that applies to reading a* ***California Connections*** *selection.*

Writing

Many ***California Connections*** selections can be used as a model for future student writing tasks applying the Writing Literacy Standards by noting how the author structures the text, organizes the ideas, and provides well-chosen relevant and sufficient facts, extended definitions, concrete details, quotations, or other information and examples.

Using the *California Connections* Selection

The following pages note specific places where the ***California Connections*** selection provides examples for specific Writing Literacy Standards for Science and Technical Subjects, using this selection as a writing model. They also provide suggestions for teaching students to analyze text structure using the Reading Literacy Standards for Science and Technical Subjects. Teachers can incorporate more suggestions from the list above. In addition, for teachers of self-contained classrooms, ELA standards are included.

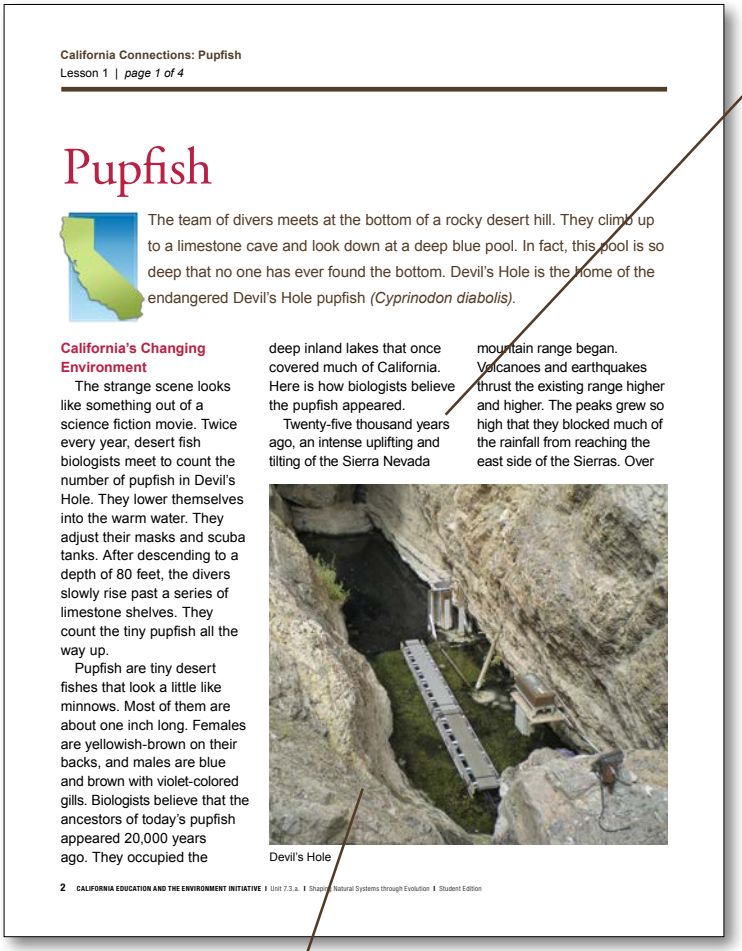
California Connections and Common Core

RST.6–8.1: Cite specific textual evidence to support analysis of science and technical texts.

Suggestion: *Throughout the selection, have students cite evidence that supports what it says explicitly as well as explaining inferences that can be drawn. Have students explain the details that work together to create inferences.*

RST.6–8.2: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

Suggestion: *After reading each section, ask students to summarize the central idea and note how it is conveyed.*



California Connections: Pupfish
Lesson 1 | *page 1 of 4*

Pupfish

The team of divers meets at the bottom of a rocky desert hill. They climb up to a limestone cave and look down at a deep blue pool. In fact, this pool is so deep that no one has ever found the bottom. Devil's Hole is the home of the endangered Devil's Hole pupfish *(Cyprinodon diabolis)*.

California's Changing Environment

The strange scene looks like something out of a science fiction movie. Twice every year, desert fish biologists meet to count the number of pupfish in Devil's Hole. They lower themselves into the warm water. They adjust their masks and scuba tanks. After descending to a depth of 80 feet, the divers slowly rise past a series of limestone shelves. They count the tiny pupfish all the way up.

Pupfish are tiny desert fishes that look a little like minnows. Most of them are about one inch long. Females are yellowish-brown on their backs, and males are blue and brown with violet-colored gills. Biologists believe that the ancestors of today's pupfish appeared 20,000 years ago. They occupied the deep inland lakes that once covered much of California. Here is how biologists believe the pupfish appeared.

Twenty-five thousand years ago, an intense uplifting and tilting of the Sierra Nevada mountain range began. Volcanoes and earthquakes thrust the existing range higher and higher. The peaks grew so high that they blocked much of the rainfall from reaching the east side of the Sierras. Over

Devil's Hole

2 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit 7.3.a. | Shaping Natural Systems through Evolution | Student Edition

RST.6–8.5: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

Suggestion: *Lead students to notice that this section goes back in time to describe how the range was formed, using a combined chronological and cause/effect organization.*

RST.6–8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6–8.5: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

Suggestion: *Throughout the article, note the subheadings and how they contribute to the organization of the text.*

WHST.6–8.2c: Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

California Connections: Pupfish
Lesson 1 | *page 2 of 4*

time, the large inland lakes east of the Sierras began to evaporate, and many species did not have enough habitat to survive and became extinct.

As the lakes evaporated, they formed many smaller ponds, resulting in small populations of pupfish that were physically isolated from each other. Only organisms that had the adaptive trait to deal with the now-harsh environment survived. These individuals reproduced, passing on their survival features to the next generation of pupfish. Because each desert environment was different, or because the individuals had different traits that allowed them to survive, survive, these groups of pupfish evolved (speciated) into different species with unique traits.

Devil's Hole pupfish

Pupfish Adaptations

Today, several species of pupfish are found in a few isolated ponds, creeks, and pools. Salt Creek pupfish (*Cyprinodon salinus salinus*) live in the shallow water of Salt Creek in Death Valley National Park. They are able to live in water that is three times saltier than any ocean. These pupfish hatch in the springtime, when rains fill the creek. They grow to adulthood in two to three months. When they breed, they leave their eggs in the algae of the streambed. Many of the pupfish die in the summertime when Salt Creek dries out.

A few miles south and east of Death Valley, near Tecopa, California, the Tecopa pupfish (*Cyprinodon nevadensis calidae*) lived in the salty, warm pools. They had survived by eating algae in the 108° F water with no predators for thousands of years. Unfortunately, the owner of the hot springs in the area built canals and bathhouses for visitors in the 1940s. He brought in mosquito fish to eat the Insects that might otherwise have bothered his guests. After he built the canals, the pupfish began washing downstream, out of their unique habitats. The mosquito fish ate the pupfish that did not wash away. As result, in 1970, the Tecopa pupfish was listed as endangered; by 1978, it was extinct.

Mosquito fish

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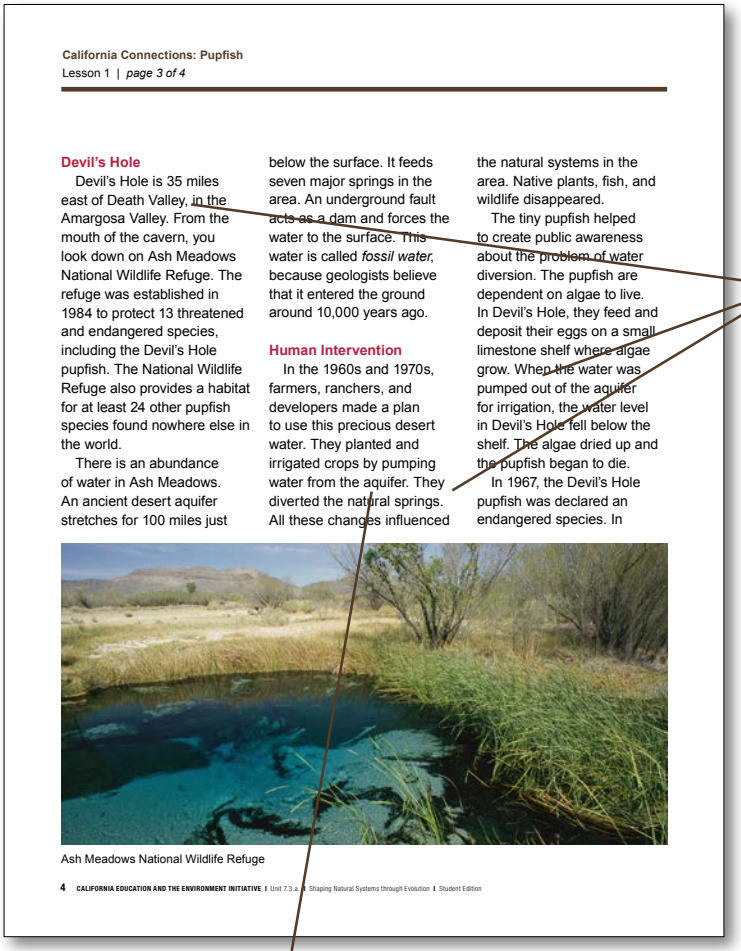
RST.6–8.1: Cite specific textual evidence to support analysis of science and technical texts.

WHST.6–8.1b: Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text…

Suggestion: *The author makes a claim here. What textual evidence throughout the article supports this claim? What is inferred? Is it well-supported?*

RST.6–8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Suggestion: *See notes on the previous page connecting the photos to the text and to the visual aid used in this lesson.*



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Devil's Hole

Devil's Hole is 35 miles east of Death Valley, in the Amargosa Valley. From the mouth of the cavern, you look down on Ash Meadows National Wildlife Refuge. The refuge was established in 1984 to protect 13 threatened and endangered species, including the Devil's Hole pupfish. The National Wildlife Refuge also provides a habitat for at least 24 other pupfish species found nowhere else in the world.

There is an abundance of water in Ash Meadows. An ancient desert aquifer stretches for 100 miles just below the surface. It feeds seven major springs in the area. An underground fault acts as a dam and forces the water to the surface. This water is called *fossil water*, because geologists believe that it entered the ground around 10,000 years ago.

Human Intervention

In the 1960s and 1970s, farmers, ranchers, and developers made a plan to use this precious desert water. They planted and irrigated crops by pumping water from the aquifer. They diverted the natural springs. All these changes influenced the natural systems in the area. Native plants, fish, and wildlife disappeared.

The tiny pupfish helped to create public awareness about the problem of water diversion. The pupfish are dependent on algae to live. In Devil's Hole, they feed and deposit their eggs on a small limestone shelf where algae grow. When the water was pumped out of the aquifer for irrigation, the water level in Devil's Hole fell below the shelf. The algae dried up and the pupfish began to die.

In 1967, the Devil's Hole pupfish was declared an endangered species. In

Ash Meadows National Wildlife Refuge

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L.7.1b: Choose among simple, compound, complex, and compound-complex sentences to signal differing relationships among ideas.

L.7.1c: Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.

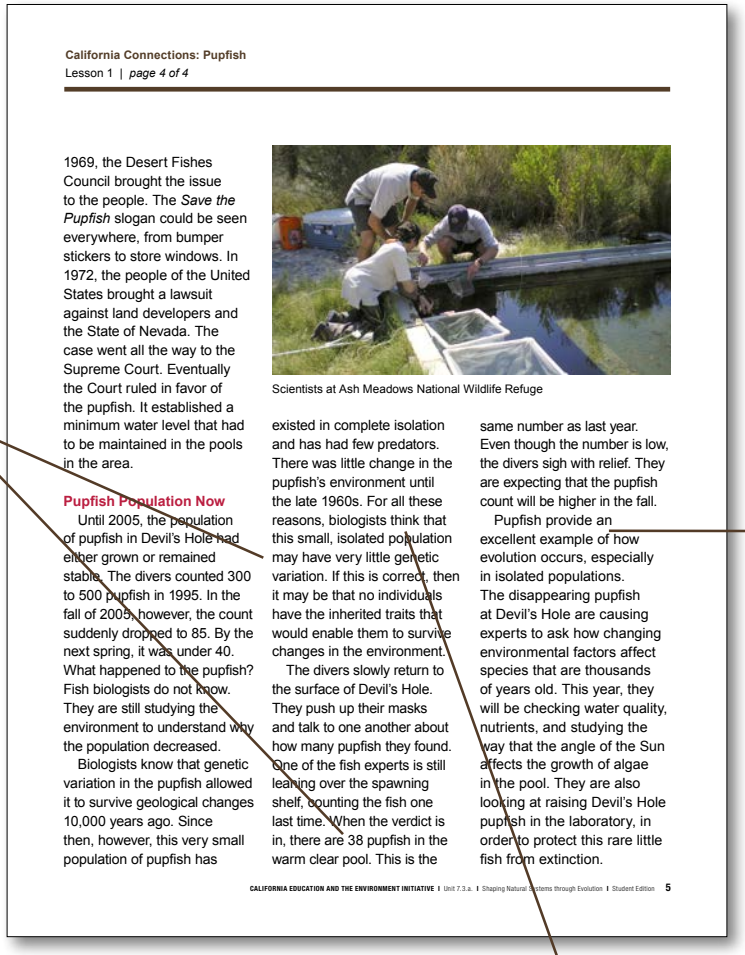
Suggestion: *Ask students why this threat may cause problems for the pupfish.*

L.7.4b: Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., *belligerent, bellicose, rebel*).

RST.6–8.1: Cite specific textual evidence to support analysis of science and technical texts.

WHST.6–8.1b: Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text…

Suggestion: *The author makes a claim here. What textual evidence throughout the article supports this claim? What is inferred? Is it well-supported?*



California Connections: Pupfish
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1969, the Desert Fishes Council brought the issue to the people. The *Save the Pupfish* slogan could be seen everywhere, from bumper stickers to store windows. In 1972, the people of the United States brought a lawsuit against land developers and the State of Nevada. The case went all the way to the Supreme Court. Eventually the Court ruled in favor of the pupfish. It established a minimum water level that had to be maintained in the pools in the area.

Scientists at Ash Meadows National Wildlife Refuge

Pupfish Population Now

Until 2005, the population of pupfish in Devil's Hole had either grown or remained stable. The divers counted 300 to 500 pupfish in 1995. In the fall of 2005, however, the count suddenly dropped to 85. By the next spring, it was under 40. What happened to the pupfish? Fish biologists do not know. They are still studying the environment to understand why the population decreased.

Biologists know that genetic variation in the pupfish allowed it to survive geological changes 10,000 years ago. Since then, however, this very small population of pupfish has existed in complete isolation and has had few predators. There was little change in the pupfish's environment until the late 1960s. For all these reasons, biologists think that this small, isolated population may have very little genetic variation. If this is correct, then it may be that no individuals have the inherited traits that would enable them to survive changes in the environment.

The divers slowly return to the surface of Devil's Hole. They push up their masks and talk to one another about how many pupfish they found. One of the fish experts is still leaning over the spawning shelf, counting the fish one last time. When the verdict is in, there are 38 pupfish in the warm clear pool. This is the same number as last year. Even though the number is low, the divers sigh with relief. They are expecting that the pupfish count will be higher in the fall.

Pupfish provide an excellent example of how evolution occurs, especially in isolated populations. The disappearing pupfish at Devil's Hole are causing experts to ask how changing environmental factors affect species that are thousands of years old. This year, they will be checking water quality, nutrients, and studying the way that the angle of the Sun affects the growth of algae in the pool. They are also looking at raising Devil's Hole pupfish in the laboratory, in order to protect this rare little fish from extinction.

WHST.6–8.1e: Provide a concluding statement or section that follows from and supports the argument presented.

RST.6–8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Suggestion: *Point out the factual evidence in the text versus the speculation of the biologist.*

California Common Core State Standards Descriptions

Language Standards

- **L.7.1:** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
  - b) Choose among simple, compound, complex, and compound-complex sentences to signal differing relationships among ideas.
  - c) Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.
- **L.7.4:** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 7 reading and content*, choosing flexibly from a range of strategies.
  - a) Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
  - b) Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., *belligerent, bellicose, rebel*).
  - c) Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech **or trace the etymology of words**. **CA**

Speaking and Listening Standards

- **SL.7.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 7 topics, texts, and issues,* building on others' ideas and expressing their own clearly.
  - c) Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
  - d) Acknowledge new information expressed by others and, when warranted, modify their own views.
- **SL.7.2:** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
- **SL.7.4:** Present claims and findings **(e.g., argument, narrative, summary presentations),** emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation. **CA**
- **SL.7.5:** Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

Reading Literacy Standards in Science and Technology Subjects

- **RST.6–8.1:** Cite specific textual evidence to support analysis of science and technical texts.
- **RST.6–8.2:** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- **RST.6–8.3:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **RST.6–8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
- **RST.6–8.5:** Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
- **RST.6–8.6:** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
- **RST.6–8.7:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- **RST.6–8.8:** Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

- **RST.6–8.9:** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
- **RST.6–8.10:** By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

- **WHST.6–8.1:** Write arguments focused on *discipline-specific content*.
  - b) Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
  - e) Provide a concluding statement or section that follows from and supports the argument presented.
- **WHST.6–8.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
  - b) Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
  - c) Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
  - d) Use precise language and domain-specific vocabulary to inform about or explain the topic.
- **WHST.6–8.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **WHST.6–8.6:** Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
- **WHST.6–8.8:** Gather relevant information from multiple print and digital sources **(primary and secondary)** using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. **CA**
- **WHST.6–8.9:** Draw evidence from informational texts to support analysis, reflection, and research.